ARMY RDT&E BUDGET IT	EM JUS	TIFICA	ATION (R	-2 Exhib	oit)		DATE Fe	bruary 20	000
BUDGET ACTIVITY 5 - Engineering and Manufacturing Developn	nent	0	NUMBER AND 604814A ngineering	Sense an		y Armor	Munition	-	
COST (In Thousands)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	30305	2412	28 52848	66968	66444	56245	28204	Continuing	Continuing
D644 Generic SADARM Engineering Development	30305	2412	21043	2854	0	0	0	0	1030145
D708 XM982 Projectile	0		0 31805	64114	66444	56245	28204	Continuing	Continuing

A. <u>Mission Description and Budget Item Justification</u>: Sense and Destroy Armor (SADARM) munitions will provide an enhanced fire/counterfire capability for 155mm howitzer delivery systems. SADARM can attack targets well beyond the Forward Line of Troops (FLOT) in a fire-and-forget mode. SADARM can be used in day and night, inclement weather and degraded battlefield conditions.

These capabilities will be enhanced by the SADARM Product Improvement (PI) program which began in FY 1997. The PI SADARM submunition will have an enlarged footprint (permitting each submunition to cover approximately three times the area of the Basic SADARM), and improved infrared sensor to see targets from higher altitudes. As a result, the PI SADARM will be more effective against all of its targets. When ejected from the 155mm projectile, the PI SADARM submunitions deploy and descend toward the ground at a constant velocity and spin rate. The submunitions contain an improved sensing mechanism which combines a dual-mode millimeter wave sensor with an improved infrared sensor array. If a target is present within the scan area, the submunition detects and destroys the target. The SADARM Product Improvement Program is in direct support of the new Army Vision/Transformation.

The XM982 (Excalibur) is a family of precision guided, extended range 155mm artillery projectiles with modular payloads of Dual Purpose Improved Conventional Munitions (DPICM), PI-SADARM, and Unitary. It will extend the range of the M190A6, 155mm Paladin and the Lightweight 155mm Howitzer to approximately 37 kilometers, with the Modular Artillery Charge System (MACS) in Crusader extending the range to 47 kilometers. Prior to FY01, funding for the XM982 Program is in Program Element 0604802, Project D695.

Page 1 of 10 Pages

Exhibit R-2 (PE 0604814A)

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)

February 2000

BUDGET ACTIVITY

5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE

0604814A Sense and Destroy Armor Munition - Engineering Development

B. Program Change Summary	<u>FY 1999</u>	<u>FY 2000</u>	FY 2001
Previous President's Budget (<u>FY 2000/2001 PB</u>)	31602	19366	9775
Appropriated Value	31813	24366	
Adjustments to Appropriated Value			
a. Congressional General Reductions	-211		
b. SBIR / STTR	-832		
c. Omnibus and Other Above Threshold Reductions		-98	
d. Below Threshold Reprogramming	-339		
e. Rescissions	-126	-140	
Adjustments to Budget Years Since FY 2000/2001 PB			+34073
New Army Transformation Adjustment			+9000
Current Budget Submit (FY 2001 PB)	30305	24128	52848

Change Summary Explanation: FY 2001: Transfer from SADARM Procurement to RDTE to fund a restructured PI SADARM program (+11394); Excalibur XM982 Projectile funding transferred from 604802.D695 to 604814.D708 to support Excalibur XM982-D and initiate XM982-S development. Project D644 increased (+9000) in support of the New Army Transformation.

Page 2 of 10 Pages

Exhibit R-2 (PE 0604814A)

ARMY RDT&E BUDGET IT	EM JUS	TIFICA	TION (R-	2A Exhi	ibit)		DATE Fe	bruary 2	000
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	nent	0	NUMBER AND 604814A Ingineering	Sense an		y Armor	Munition		PROJECT D644
COST (In Thousands)	FY1999 Actual	FY 2000 Estimate		FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D644 Generic SADARM Engineering Development	30305	241	28 21043	2854	0	0	0	0	1030145

A. <u>Mission Description and Justification</u>: Sense and Destroy Armor (SADARM) munitions will provide an enhanced fire/counterfire capability for 155mm howitzer delivery systems. SADARM can attack targets well beyond the Forward Line of Troops (FLOT) in a fire-and-forget mode. SADARM can be used in day and night, inclement weather and degraded battlefield conditions.

These capabilities will be enhanced by the SADARM Product Improvement (PI) program which began in FY 1997. The PI SADARM submunition will have an enlarged footprint (permitting each submunition to cover approximately three times the area of the Basic SADARM), improved infrared sensor to see targets from higher altitudes. As a result, the PI SADARM will be more effective against all of its targets. When ejected from the 155mm projectile, the PI SADARM submunitions deploy and descend toward the ground at a constant velocity and spin rate. The submunitions contain an improved sensing mechanism which combines a dual-mode millimeter wave sensor with an improved infrared sensor array. If a target is present within the scan area, the submunition detects and destroys the target. The SADARM Product Improvement Program is in direct support of the new Army Vision/Transformation.

FY 1999 Accomplishments:

- 1000 Continue simulation efforts with Hardware in the Loop (HWIL) to conduct hardware/software trade studies for PI SADARM.
- 4698 Select optimum warhead design and begin lethal mechanism range firings.
- 12738 Sensor Development:

Prototype development and initial fabrication of component level sensor hardware.

Testing to assure gun survivability of sensor components.

- 4128 Continued procurement and fabrication of test hardware.
- 7741 Continued government support to Initial Production Test (IPT) design and gun survivability testing.

Total 30305

FY 2000 Planned Program:

- Support HWIL for the qualification of the improved sensor electronics.
- 14189 Continued sensor design effort and fabrication of system test hardware consisting of sensor units and inert flight hardware.
- 4460 Limited User Testing.
- 4091 Government support to IPT, and gun survivability testing.
- Small Business Innovative Research/Small Business Technology Transfer (SBIR/STTR) Programs

Project D644 Page 3 of 10 Pages Exhibit R-2A (PE 0604814A)

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit) BUDGET ACTIVITY 5 - Engineering and Manufacturing Development Engineering Development DATE February 2000 PROJECT 0604814A Sense and Destroy Armor Munition Engineering Development

Total 24128

FY 2001 Planned Program:

- 700 HWIL support for qualification of improved electronics..
- 11786 Fabricate captive flight special test equipment, conduct testing and qualify electronics.
- 1445 Fabrication of system level test hardware consisting of inert flight hardware and tactical projectiles.
- 7112 Government support to IPTs and ballistic ejection testing ...

Total 21043

B. Other Program Funding Summary	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	То	Total
								<u>Compl</u>	Cost
Procurement Ammunition, Army, SSN E66300	31275	14938	14907						294796
Proj Arty 155mm SADARM M898									

C. <u>Acquisition Strategy:</u> The Cost Plus Incentive Fee (CPIF) contracts were awarded in FY 1986 to Aerojet Electrosystems and Honeywell. In FY 1991, a design select eliminated the Honeywell competition. Aerojet then selected Honeywell (now Alliant Techsystems) as their prime sub-contractor and they have continued this relationship into production. The Engineering and Manufacturing Development contract with Aerojet has been completed.

The SADARM Submunition Product Improvement Program was awarded on 24 February 1997 to GenCorp Aerojet, Azusa, CA for the design, development, fabrication, integration, and testing of improvements on a sole source basis in accordance with FAR 6.302-1, Only One Responsible Source. Due to a funding decrement in FY98, contract restructure modification P00013 was signed on 19 March 1998 reflecting a no cost 5-month period of performance extension (from April 2001 to September 2001). Currently, a contract restructure is in progress to reflect scope changes due to the impacts of additional testing, modeling and simulation efforts required by the user community and the limitations of funding in FY 00.

D. Schedule Profile	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2004	FY 2005
Complete Contract Restructure		2 Qtr						
Limited Users Test (LUT)		3 Qtr						
Initiate System Test 1 (ST1)			4 Qtr					
Complete PI EMD Contract			4 Qtr					

Project D644 Page 4 of 10 Pages Exhibit R-2A (PE 0604814A)

	Al	RMY RDT&E CO	OST AN	IALYS	IS (R-3))			DA		uary 20	00
BUDGET ACTIVITY 5 - Engineering and	Manufact	uring Developme	nt	060	^{UMBER AND} 04814A gineerin	Sense a		•	mor Mu	nition -		ROJECT 644
I. Product Development	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Targe Value o Contrac
a. Prod Improv: Contract	SS/CPAF	Aerojet- Azusa, CA	10612	21564	OCT 98	14189	OCT 99	13231	OCT 00		59596	
b. Basic SADARM Contract	C/CPIF	Aerojet- Azusa, CA	436202	0		0		0		0	436202	
c. Government Support d. Basic SADARM Contract	C/CPIF	Alliant Tech Sys Hopkins, MN	60493 188038	0		0		0		0	60493 188038	
e. MLRS Rocket Integration	SS/CPIF	Loral Vought Sys Dallas, TX	90535	0		0		0		0	90535	
f. Miscellaneous Subtotal Product Development:	MIPR		7645 793525	0 21564		350 14539		13231		0	7995 842859	
II. Support Costs	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Targe Value o
a. PM SADARM	Allot	Picatinny Arsenal, NJ	761	430	Date	614	Date	657	Date	450	2912	Contra
b. ARDEC Eng Supportc. MLRS Rocket Integration	MIPR MIPR	Picatinny Arsenal, NJ PMO-MLRS, Huntsville, AL	16918 16266	4666	Multi	2597 0	Multi	3025	Multi	875 0	28081 16266	
d. Miscellaneous Subtotal Support Costs:	MIPR	1101105 11105, 1112	8868 42813	78 5174	Multi	638 3849		0 3682	Multi	229 1554	9813 57072	
Project D644				Page 5 of	10 Pages				Exhibit R	-3 (PE 060)4814A)	

	AF	RMY RDT&E CO	OST AN	IALYS	S (R-3))			DA [*]	TE Febr	uary 20	00
BUDGET ACTIVITY 5 - Engineering and	Manufact	uring Developme	nt	060	UMBER AND 04814A gineerin	Sense a		•	mor Mu	nition -		ROJECT 644
III. Test and Evaluation	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Targe Value o Contrac
a. Projectile Testing	MIPR	YPG Yuma, AZ	21117	90	DEC 99	240	DEC 99	1710	DEC 00	500	23657	
b. Rocket Testing	MIPR	WSMR New Mexico	26487	0		0		0		0	26487	
c. Limited User Test	MIPR	ATEC, Ft Sill, OK,	0	70	NOV 99	4235	JAN 00	0		0	4305	
d. Miscellaneous	MIPR		67118	207		405		640	DEC 00	0	68370	
e. HWIL PI SADARM	MIPR	MICOM, Huntsville, Ala	755	1000	JAN 99	750	DEC 99	700	DEC 00	300	3505	
f. Army Research Lab	MIPR	Adelphi, MD	0	1817		0	DEC 99	1080	DEC 00	500	3397	
g. Instrumented Rounds	SS/FFP	Aerojet-Azusa, CA	0	383	Multi	110	JAN 00	0		0	493	
Subtotal Test and Evaluation:			115477	3567		5740		4130		1300	130214	
D : . T : 10 : .			051015	20205		24120		21042		2054	1020145	
Project Total Cost:			951815	30305		24128		21043		2854	1030145	
Project D644				Page 6 of	10 Pages				Exhibit R	-3 (PE 060	14814A)	

ARMY RDT&E BUDGET ITI	EM JUS	TIFICA	TION (R-	2A Exhi	bit)		DATE Fe l	bruary 20)00
BUDGET ACTIVITY 5 - Engineering and Manufacturing Developn	nent	06	NUMBER AND S 604814A S ngineering	Sense an		y Armor	Munition		PROJECT D708
COST (In Thousands)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D708 XM982 Projectile	0		0 31805	64114	66444	56245	28204	Continuing	Continuing

A. <u>Mission Description and Budget Item Justification:</u> XM982 (Excalibur) is a family of extended range, precision guided 155mm artillery projectiles. The first variant carries 64 Dual Purpose Improved Conventional Munitions (DPICM) with a self-destruct capability. The second variant will deliver two (2) Product Improved SADARM submunitions. The third variant is a bunker busting unitary warhead. It will be compatible with M109A6 Paladin, Joint Lightweight Howitzer and Crusader. The XM982 (Excalibur) will extend the range of the 155mm Paladin (M109A6), and the Lightweight Howitzer to approximately 37 kilometers. The Excalibur (XM982) with the Modular Artillery Charge System (MACS) extends the Crusader range to 47 kilometers. The XM982 (Excalibur) will allow for greater standoff from threats and faster defeat of potential threats, increasing soldier survivability. Funding for FY 2001 and beyond has been transferred to 604814 D708 from 604802 D695.

FY 1999 Accomplishments: Project funded in PE 0604802A D695

FY 2000 Planned Program: Project funded in PE 0604802A D695

FY 2001 Planned Program:

- 5000 Initiates the SADARM variant projectile integration, structural analysis, and testing, and conduct contract option IPR.
- 6445 Complete design of projectile assembly, continued structural analysis. Build prototype subsystems for test evaluation.
- 7543 Complete design of guidance and instrumentation systems. Build prototype subsystems for evaluation, and conducts initial gun fired guidance testing.
- 4000 Complete development of system requirements and subsystem requirement allocation. Conduct laboratory and field testing and evaluation. Conduct simulation validation.
- 3264 Award systems contract for development of Platform Integration Kit and Enhanced Portable Inductive Artillery Fuze Setter (E-PIAFS)
- 5553 Purchase 115 EMD Test Articles

Total 31805

B. Other Program Funding Summary	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	То	Total
								Compl	Cost
Procurement Ammunition Army: E80100						27621	27595	Cont	Cont
EMD Test Articles - Quantity			115	55	259	494	18		

Project D708 Page 7 of 10 Pages Exhibit R-2A (PE 0604814A)

ARMY RDT&E BUDG	GET ITEN	/I JUSTIF	ICATIO	ON (R-2	A Exhil	bit)		DATE Fek	ruary 20	000
5 - Engineering and Manufacturing D	evelopme	nt	0604			-	Armor I	Munition -		PROJECT 0708
RDT&E: PE 0604802A.D695	6585	11784	0	0	0	0	0	0	20378	

C. <u>Acquisition Strategy</u>: The approved Acquisition Strategy was to award the EMD contract (FY98-01) to a systems contractor through full and open competition using formal source selection. As a result of this strategy, a contract was awarded to Raytheon-TI Systems, Inc., Lewisville, TX on 23 January 1998 for the design, development, fabrication, and engineering services in support of the development and testing of the 155MM ER DPICM XM982 Projectile, with options for the development of a SADARM and UNITARY variant. Two low rate production fixed price ceiling price options were also included in the award for the first year's buy of 3,400 each and the second year's buy of 4,900 each. Additional XM982-D scope identified in FY 1999 (including test rounds for qualification in the Crusader System) will lead to a revised Acquisition Strategy and a contract restructure.

D. Schedule Profile	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
Award Platform Integration & E-PIAFS Systems			2 Qtr				
Contract							
Initiate Guidance System Test Firings			3 Qtr				
Extended Range Demonstration				4 Qtr			
Contractor Pre-Qualification Tests					2 Qtr		
Complete Contractor Developmental Testing					2 Qtr		
Critical Design Review (CDR)					3 Qtr		
Start Developmental Test and Evaluation					3 Qtr		
Independent Program Review (IPR)					4 Qtr		
Award LRIP1 Contract						1 Qtr	
Complete Developmental Test and Evaluation							2 Qtr
First Article Test							3 Qtr

Project D708 Page 8 of 10 Pages Exhibit R-2A (PE 0604814A)

	Al	RMY RDT&E CO	DST AN	IALYSI	5 (K-3))				Febru	ary 200	00
BUDGET ACTIVITY 5 - Engineering and	Manufact	uring Developme	nt	060	UMBER AND 04814A gineerin	Sense a		•	mor Mui		PR	OJECT 708
I. Product Development	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 1999 Cost*	FY 1999 Award Date	FY 2000 Cost*	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Targe Value o Contrac
a. XM982-D Development	C/CPIF	Raytheon Systems, Tucson, AZ						14123	Oct 00	Cont.	Cont.	
b. Platform Integration Systems Contractor	C/FPI	TBD						2200	Jan 01	Cont.	Cont.	
c. XM982-S EMD Option	SS/CPIF	Raytheon Systems, Tucson, AZ								Cont.	Cont.	
d. XM982-U EMD Option	SS/CPIF	Raytheon Systems, Tucson, AZ								Cont.	Cont.	
								16323		Cont.	Cont.	
Subtotal Product Development: Program funding for FY 19	99 and 2000 1	resides in 604802.D695.						16323		Cont.	Cont.	
Development: *Program funding for FY 19	Contract Method &	Performing Activity & Location	Total PYs Cost	FY 1999 Cost*	FY 1999 Award Date	FY 2000 Cost*	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Value of
Development: Program funding for FY 19 II. Support Costs	Contract Method & Type	Performing Activity & Location						FY 2001 Cost		Cost To Complete	Total Cost	Value o
Development: *Program funding for FY 19 II. Support Costs a. XM982	Contract Method &	Performing Activity & Location PM ARMS ARDEC, Picatinny			Award		Award	FY 2001	Award	Cost To	Total	Value o
Development: Program funding for FY 19 II. Support Costs a. XM982 b. Gov't Support-XM982-D	Contract Method & Type Allot	Performing Activity & Location PM ARMS			Award		Award	FY 2001 Cost	Award Date	Cost To Complete	Total Cost	Value o
Development: FProgram funding for FY 19 II. Support Costs a. XM982 b. Gov't Support-XM982-D c. Gov't Support- Ft Sill	Contract Method & Type Allot MIPR	Performing Activity & Location PM ARMS ARDEC, Picatinny Arsenal, NJ			Award		Award	FY 2001 Cost 800 4826	Award Date Multi	Cost To Complete Cont. Cont.	Total Cost Cont. Cont.	Value o
Development: *Program funding for FY 19 II. Support Costs a. XM982 b. Gov't Support-XM982-D c. Gov't Support-Ft Sill d. T250 Support	Contract Method & Type Allot MIPR MIPR	Performing Activity & Location PM ARMS ARDEC, Picatinny Arsenal, NJ Ft. Sill, OK SAVIT,			Award		Award	FY 2001 Cost 800 4826	Award Date Multi	Cost To Complete Cont. Cont. Cont.	Total Cost Cont. Cont.	Value o
Development: Program funding for FY 19 II. Support Costs a. XM982 b. Gov't Support-XM982-D c. Gov't Support-Ft Sill d. T250 Support e. Gov't Support-XM982-S	Contract Method & Type Allot MIPR MIPR SS/FP	Performing Activity & Location PM ARMS ARDEC, Picatinny Arsenal, NJ Ft. Sill, OK SAVIT, Parsippany, NJ ARDEC, Picatinny			Award		Award	FY 2001 Cost 800 4826 300	Award Date Multi Oct 00	Cost To Complete Cont. Cont. Cont. Cont.	Total Cost Cont. Cont. Cont. Cont.	Value o
	Contract Method & Type Allot MIPR MIPR SS/FP MIPR	Performing Activity & Location PM ARMS ARDEC, Picatinny Arsenal, NJ Ft. Sill, OK SAVIT, Parsippany, NJ ARDEC, Picatinny Arsenal, NJ ARDEC, Picatinny			Award		Award	FY 2001 Cost 800 4826 300	Award Date Multi Oct 00	Cost To Complete Cont. Cont. Cont. Cont. Cont.	Total Cost Cont. Cont. Cont. Cont. Cont.	Targe Value o Contrac

ARMY RDT&E COST ANALYSIS (R-3)										DATE February 2000			
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development					PE NUMBER AND TITLE 0604814A Sense and Destroy Armor Engineering Development					nition -	PROJECT D708		
III. Test and Evaluation	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 1999 Cost*	FY 1999 Award Date	FY 2000 Cost*	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Targe Value of Contract	
a. TECOM Testing	MIPR	YPG, Yuma, AZ						3000	Nov 00	Cont.	Cont.		
b. Army Research Labs	MIPR	ARL, Adelphia, MD						700	Nov 00	Cont.	Cont.		
c. XM982-D Test Support	SS/FP	TBD								Cont.	Cont.		
Subtotal Test and Evaluation:								3700			Cont.		
Project D708 Page 1					Page 10 of 10 Pages Exhib					ibit R-3 (PE 0604814A)			